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(19) (CA) **CANADIAN PATENT** (12)

(54) Hair Brightener

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493903

#### ABSTRACT

Fluorescent compounds, for example, coumarin derivatives are employed to impart a fluorescent or bright quality to hair; the compounds may be employed as ingredients in conventional hair treatment compositions, for example, hair washing formulations; an especially preferred fluorescent compound is 7-diethylamino-4-methylcoumarin

This invention relates to hair treatment compositions and methods of treating hair.

Fluorescent whitening agents also known as optical brighteners have been employed by detergent manufacturers to increase the whiteness or brightness of clothing which has been washed with such detergents.

Such fluorescent whitening agents have also been employed in paint compositions to increase the whiteness of white pigments such as titanium dioxide (Chemical Abstracts Vol. 74, 1971, 143399a).

These agents are, in particular, fluorescent organic compounds which absorb radiation or light at one wavelength or region and emit it at a different wavelength or region. In particular, the absorbed radiation or light excites the agent to a higher electronic state and then emits visible radiation in passing to a lower electronic state.

The present invention is more especially concerned with fluorescent organic compounds which absorb incident light in the ultraviolet region and emit part of the absorbed <sup>energy</sup> ~~energy~~ as visible light, especially in the blue region of the visible spectrum.

In accordance with the present invention it has now been found that certain fluorescent organic compounds can be employed to impart a fluorescent or "bright" quality to the hair.

Particular fluorescent compounds employed in accordance with the invention have a substantivity for the keratinaceous substrate of hair and will thus bind to the hair.

The fluorescent organic compounds may be employed in a variety of hair treatment compositions including hair washing compositions or shampoos, hair conditioning compositions, hair setting compositions, hair colouring compositions and hair

rinsing compositions, in which case other active ingredients will also be present in the composition. The fluorescent organic compounds may also be employed as the sole active ingredient in a new class of hair treatment compositions employed solely to impart a fluorescent quality to hair.

The invention thus provides hair treatment compositions comprising an acceptable amount of a fluorescent organic compound having a substantivity for the keratinaceous substrate of the hair in association with an acceptable carrier or vehicle.

10       The invention also provides a method of brightening hair or imparting a brightening effect to hair which comprises applying a brightening amount of a fluorescent compound of the invention to hair.

It will be understood that an acceptable amount of the compound in the composition is one such that treatment of the hair with the composition will result in binding of an amount (herein referred to as a brightening amount) of the compound to the hair, effective to achieve a discernible and desired fluorescent effect visible to the human eye.

20       If the concentration of the fluorescent compound is too low, either no discernible effect will be produced, or repeated use of the composition a plurality of times may be required in order to achieve a discernible effect.

If the concentration of the fluorescent compound is too high the presence of the compound in the hair may be noticeable and an unsightly, unclean appearance may result; in addition increasing the concentration beyond what is required, increases the cost unnecessarily.

30       Generally it is found that a concentration of about 0.0001% to about 2%, by weight, of fluorescent compound, based on the weight of the composition, provides satisfactory results. preferably the concentration is about 0.005 % to about 0.05 %,

by weight.

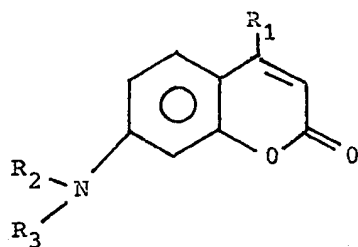
It will be understood that an acceptable carrier or vehicle is one which is relatively inert, which will not deleteriously interfere with the binding of the compound to the hair and which will not affect the hair or scalp such that its application to a head of hair would be harmful.

Liquid vehicles employed in existing hair treatment compositions are suitable for use in the compositions of the invention. Thus suitable liquid vehicles include hair washing  
10 formulations, hair conditioning formulations, hair setting formulations, hair colouring formulations and hair rinsing formulations.

It will be understood that when the hair treatment composition has a function other than to impart a fluorescent quality to the hair, it will contain other ingredients necessary for its function, for example, washing or colouring agents.

A particularly useful class of fluorescent compounds for use in the composition of the invention are coumarin derivatives of formula (I)

20



(I)

wherein  $R_1$ ,  $R_2$  and  $R_3$ , which may be the same or different are selected from the group consisting of straight or branched chain alkyl and hydroxyalkyl groups of 1 to 6 carbon atoms.

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An especially preferred compound (I) is 7 diethylamino-4-methylcoumarin ( $R_1$  is methyl,  $R_2$  and  $R_3$  are ethyl) which exhibits the following characteristics:

Ionic Character:	weakly cationic
Absorption maximum:	375 nm (in ethanol)
Fluorescence maximum:	440 nm (on wool)

The compositions of the invention may additionally contain one or more conventional additives selected from surface active agents, perfume, colouring substances, inorganic salts, oxidizing agents, reducing agents, oils, alkanols, glycols, waxes, polymers, herbal extracts, animal extracts and silicones.

The invention is further illustrated by reference to  
10 the accompanying drawings in which:

Fig. 1 illustrates graphically the reflectance/emission curve of 7-diethylamino-4-methylcoumarin on a substrate of polyamide fibres.

Fig. 2 illustrates graphically the increase in the brightness effect achieved employing a composition in accordance with the invention, applied to a wool substrate.

The invention is further illustrated by reference to the following Examples.

#### EXAMPLE 1

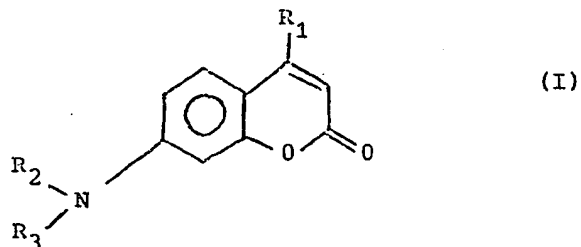
20 7-Diethylamino-4-methylcoumarin was added to a wash liquid suitable for wool, in a concentration of 0.0002%, by weight. A woollen substrate was washed successively 1 to 15 times in the wash liquid at a temperature of about 40°C., each wash being for a period of about 15 minutes. The brightness of the substrate was rated on a scale of 1 to 15 after each wash. The brightness scale employed is an arbitrary scale quantified with the use of a suitable spectrophotometer.

The results are shown graphically in Fig. 2, which shows a steady increase in brightness during the first seven  
30 washes with a less significant increase in brightness being achieved with subsequent washes.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A hair treatment composition comprising a fluorescent organic compound having a substantivity for the keratinaceous substrate of hair, in an amount effective to impart a brightening amount to hair, in association with an acceptable carrier or vehicle.

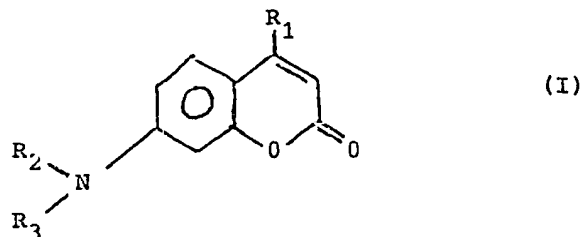
2. A hair treatment composition according to claim 1, wherein said compound is a coumarin derivative of formula (I)



wherein  $R_1$ ,  $R_2$  and  $R_3$ , which may be the same or different are selected from the group consisting of straight or branched chain alkyl and hydroxyalkyl groups of 1 to 6 carbon atoms.

3. A hair treatment composition according to claim 1, wherein said compound is 7-diethylamino-4-methylcoumarin.

4. A hair treatment composition comprising about 0.0001% to about 2%, by weight, of a coumarin derivative of formula (I):



wherein  $R_1$ ,  $R_2$  and  $R_3$ , which may be the same or different are

selected from the group consisting of straight or branched chain alkyl and hydroxyalkyl groups of 1 to 6 carbon atoms, in association with an acceptable liquid vehicle.

5. A composition according to claim 4, wherein said liquid vehicle comprises a hair washing formulation.

6. A composition according to claim 4, wherein said liquid vehicle comprises a hair conditioning formulation.

7. A composition according to claim 4, wherein said liquid vehicle comprises a hair setting formulation.

8. A composition according to claim 4, wherein said liquid vehicle comprises a hair colouring formulation.

9. A composition according to claim 4, wherein said liquid vehicle comprises a hair rinsing formulation.

10. A composition according to claim 5, 6 or 7, wherein said coumarin derivative is 7-diethylamino-4-methyl coumarin.

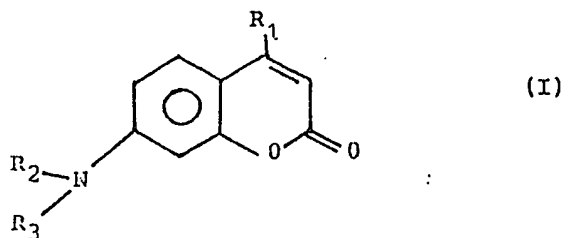
11. A composition according to claim 8 or 9, wherein said coumarin derivative is 7-diethylamino-4-methyl coumarin.

12. A composition according to claim 1, 2 or 4, further including at least one additive selected from the group consisting of surface active agents, perfume, colouring substances, inorganic salts, oxidizing agents, reducing agents, oils, alkanols, glycols, waxes, polymers, herbal extracts, animal extracts and silicones.

13. A method of brightening hair which comprises applying to said hair a brightening amount of a fluorescent organic compound having a substantivity for the keratinaceous substrate of hair.



14. A method according to claim 13, wherein said compound is a coumarin derivative of formula (I):



wherein  $R_1$ ,  $R_2$  and  $R_3$ , which may be the same or different are selected from the group consisting of straight or branched chain alkyl and hydroxyalkyl groups of 1 to 6 carbon atoms.

15. A method according to claim 13, wherein said compound is 7-diethylamino-4-methylcoumarin.

16. A composition according to claim 1 or 3, wherein said fluorescent compound is present in an amount of about 0.0001% to about 2%, by weight.



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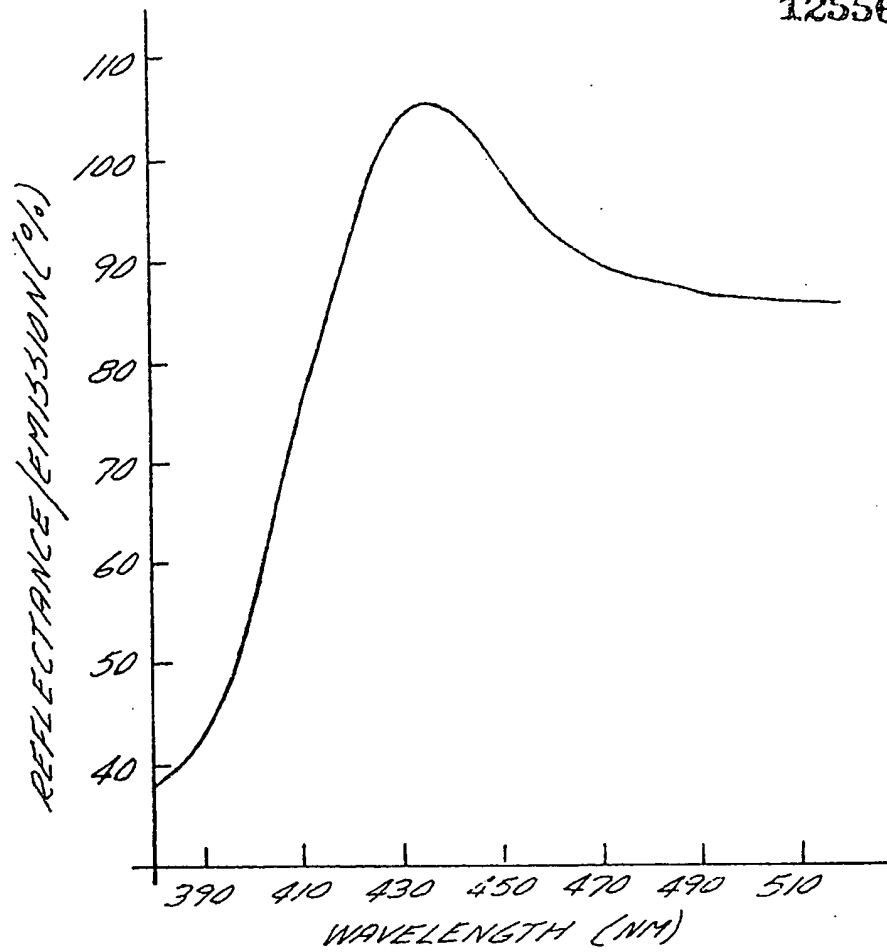


FIG. 1

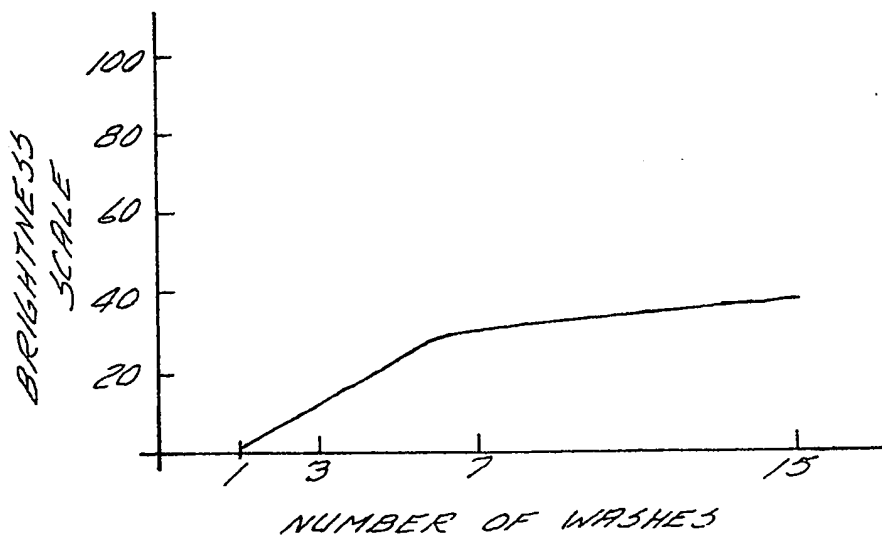


FIG. 2

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